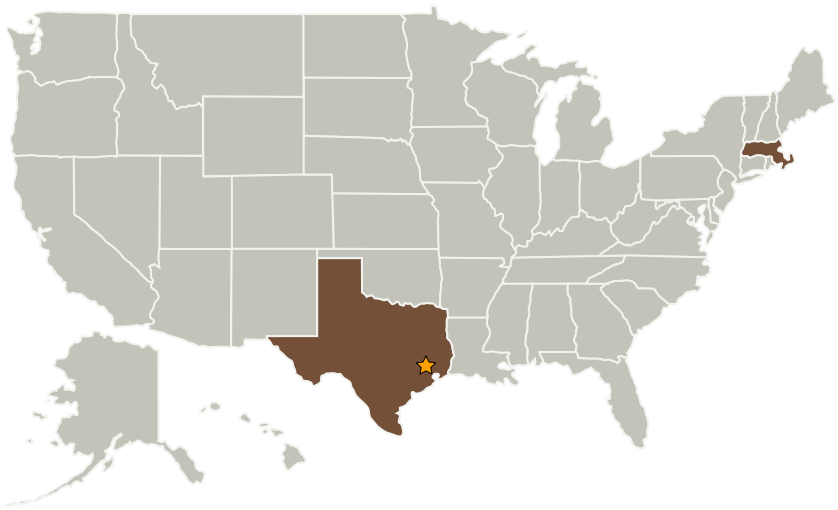
Broad Application of a Reconfigurable Motor Controller, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

An ultra-miniature (<50 grams) high-performance brushless-motor controller, code named 'Puck', has been developed by Barrett for Earth-based mobile-manipulation use where efficiency, low mass, and robustness are critical attributes. Application of a distributed intelligent system will enable these Pucks to be used liberally across a variety of NASA's future satellite, articulated-machine, and robotic applications requiring low-level robust brushless commutation directed by high-level task intelligence. In addition to supporting space-vector control of brushless motors, each Puck carries a virtually unburdened 32-bit DSP running at 80 MHz with plenty of memory and high-speed serial communications to neighboring Pucks. So even as machines increase in degrees of freedom - and therefore complexity - the excess computational power provided by the Pucks increases proportionately, working in tandem to overcome increasingly complex controls issues. While another Barrett proposal submitted to NASA is focused on developing the hardware for a space-qualified Puck controller, this proposal focuses on a control architecture that leverages the distributed DSPs. Phase I will build an architecture that best leverages a distributed network of Pucks, such as a solution of computationally-intensive kinematics equations (e.g. Jacobian matrix), and local tasks, such as estimating precise realtime velocities and supporting series-elastic-actuator (SEA) strain-gages.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Barrett Technology, LLC	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Newton, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.1 Situational and Self Awareness
    - TX10.1.1 Sensing and Perception for Autonomous Systems